



***Diamond Digital***

## **DIAMOND DIGITAL DV171J (JB)**

---

Colour TFT LCD Monitor

17" (43 cm) LCD Panel Size

# DV171J / DV171JB TFT LCD MONITOR CONTENTS

<b>1. INTRODUCTION</b>	<b>2</b>
1.1 Scope	2
1.2 Description	2
<b>2. ELECTRICAL REQUIREMENTS</b>	<b>3</b>
2.1 Standard Test Conditions	3
<i>All tests shall be performed under the following conditions, unless otherwise specified.</i>	3
2.2 LCD monitor General specification	3
2.3 LCD Panel Specification	5
2.4 Input Signals	12
2.5 CONTROLS	15
2.6 White Color Temperature	17
2.7 POWER SUPPLY	18
2.8 Plug & Play(EDID)	19
2.9 Audio Technical specification (EP577 Only)	19
<b>3. VL-731 DISPLAY CONTROL BOARD</b>	<b>21</b>
3.1 Description	21
3.2 Features	21
3.3 BLOCK DIAGRAM	22
System Block Diagram	22
3.4 Connector Locations	22
3.5 Connector Type	23
3.6 Signal Pin & Description	23
<b>4. VK-720 (EP578)/ VK-723 (EP577) Control Panel Board</b>	<b>25</b>
4.1 Description	25
4.2 Connector and Switch Locations	25
4.3 Connector type (VK-723)	25
4.4 Connector pin Assignment(VK-723)	25
4.5 Switch definition(VK-723)	26
4.6 LED definition	26
<b>5. POWER SUPPLY &amp; INVERTER BOARD</b>	<b>27</b>
5.1 Description	27
5.2 Power supply ( AC to DC section)	27
5.3 Inverter (DC to AC Section)	28
5.4 Electrical characteristics	28
5.5 Connector locations	30
<b>6. TROUBLESHOOTING</b>	<b>32</b>
6.1 Main Procedure	33
<b>Appendix A: EP577 PCBA Assembly</b>	<b>35</b>
<b>Appendix B: EP578 PCBA Assembly</b>	<b>45</b>
<b>Appendix C: DISPLAY UNIT ASSEMBLY</b>	<b>56</b>

# 1. INTRODUCTION

## 1.1 Scope

This specification defines the requirements for the 17" MICRO-PROCESSOR based Multi-mode supported high resolution color LCD monitor, This monitor can be directly connected to general 15 pin D-sub VGA connector, eliminates the requirement of optional special display card. It also supports VESA DPMS power management and plug & play function. There is a build-in stereo audio amplifier with volume control to drive a pair of speakers.

## 1.2 Description

The LCD monitor is designed with the latest LCD technology to provide a performance oriented product with no radiation. This will alleviate the growing health concerns. It is also a space saving design, allowing more desktop space, and comparing to the traditional CRT monitor, it consumes less power and gets less weight in addition MTBF target is 20k hours or more.

Comparison Chart of EP577/578

	EP578	EP577
Panel	Normal 17" panel	Normal 17" panel
Signal Interface	DSUB	DSUB
Sync Type for analog input	Separate / compatible /	Separate / compatible /
Color Temp user adjust	<b>Support</b>	Support
DDC	DDC2B	DDC2B
Speaker	No	1W+1W
Headphone Jack	No	Yes
Microphone Jack	No	No
USB Hub	Not support	Not support
Tilt / Swivel	Yes / No	Yes / No

## 2. ELECTRICAL REQUIREMENTS

### 2.1 Standard Test Conditions

All tests shall be performed under the following conditions, unless otherwise specified.

<u>Ambient light:</u>	225 lux
<u>Viewing distance :</u>	50 cm in front of LCD panel
<u>Warm up time</u>	
All specifications:	30 minutes
Fully functional:	5 seconds
<u>Measuring Equipment:</u>	Chroma 2250 signal generator or equivalent, directly Connected to the monitor under test. Minolta CA100 photometer, or equivalent
<u>Control settings</u>	
User brightness control:	Maximum (unless otherwise specified )
User contrast control:	Typical (unless otherwise specified )
User red/white balance, Green/white balance and Blue/white balance control:	In the center (unless otherwise specified )
<u>Power input :</u>	110Vac or 230Vac
<u>Ambient temperature :</u>	$20 \pm 5^{\circ}\text{C}$ ( $68 \pm 9^{\circ}\text{F}$ )
<u>Analog input mode :</u>	1280 x1024 /60 Hz

#### 2.1.1 MEASUREMENT SYSTEMS

The units of measure stated in this document are listed below:

1 gamma = 1 nano tesla

1 tesla = 10,000 gauss

cm = in x 2.54

lb = kg x 2.2

degrees F =  $[\text{°C} \times 1.8] + 32$

degrees C =  $[\text{°F} - 32]/1.8$

$u' = 4x/(-2x + 12y + 3)$

$v' = 9y/(-2x + 12y + 3)$

$x = (27u'/4)/[(9u'/2) - 12v' + 9]$

$y = (3v')/[(9u'/2) - 12v' + 9]$

nits =  $\text{cd}/(\text{m}^2) = \text{Ft-L} \times 3.426$

lux = foot-candle x 10.76

### 2.2 LCD monitor General specification

<b>Panel Type:</b>	17 “ active matrix color TFT LCD 1). QDI17EL07-01 2). Hydis HT17E12-200 3). Toppoly TD170WGCA1
<b>Display size:</b>	37.92mm (H) × 270.34mm(V)
<b>Display mode:</b>	VGA 720 × 400 (70 Hz) VGA 640 × 480 (60/66/70/72/75 Hz) SVGA 800 × 600 (60/70/72/75 Hz) XGA 1024 × 768 (60/70/75 Hz)

	SXGA 1280 × 1024 (60/70/75 Hz) standard resolution
<b>Pixel pitch:</b>	0.264mm(H) × 0.264mm(V)
<b>Display Dot:</b>	1280 x (RGB) × 1024
<b>Pixel Clock:</b>	25.2 – 135.0MHz
<b>Contrast ratio: <math>\theta = 0^\circ</math> (typ)</b>	QDI 350 : 1, Hydis 430 : 1 , Toppoly 450:1
<b>(min)</b>	QDI 300 : 1, Hydis 300 : 1 , Toppoly 300:1
<b>Brightness: (typ)</b>	QDI: 300 , Hydis: 250 , Toppoly: 260
<b>(min)</b>	QDI: 200 , Hydis: 200 , Toppoly: 200
<b>Response time (Tr/Tf):</b>	QDI(18 /17), Hydis(20), Toppoly(4/12)
<b>Display color:</b>	QDI 16.2M(6 bit color+FRC), Hydis 16.2M(6bit color+FRC)
	Toppoly 16.2M(6 bit color+FRC)
<b>Viewing angle:</b>	QDI L / R $\geq 75^\circ / \geq 75^\circ (\geq 150^\circ \text{ degrees horizontal typical})$
	U / D $\geq 65^\circ / \geq 60^\circ (\geq 125^\circ \text{ degrees vertical typical})$
	Hydis L / R $\geq 80^\circ / \geq 80^\circ (\geq 160^\circ \text{ degrees horizontal typical})$
	U / D $\geq 65^\circ / \geq 65^\circ (\geq 130^\circ \text{ degrees vertical typical})$
	Toppoly L / R $\geq 75^\circ / \geq 75^\circ (\geq 150^\circ \text{ degrees horizontal typical})$
	U / D $\geq 75^\circ / \geq 60^\circ (\geq 135^\circ \text{ degrees vertical typical})$
<b>Luminance Uniformity:</b>	> 75 % (typical)
<b>Pc interface:</b>	1). Video: RGB analog 0.7V peak to peak Sync: TTL positive or negative
	2). Digital TMDS
<b>Signal connector:</b>	15 pin Mini D type, (standard VGA video)
	DVI-D connector
	3.5 mm stereo audio jack (Audio)(EP577)
	3.5 mm miniature stereo Headphone jack (EP577)
<b>Audio power:</b>	1Wrms + 1Wrms (300Hz – 10kHz (S.P.L. – 10 dB)) (EP577)
<b>Front control:</b>	power on/off with LED select adjustment (+,-)
<b>Interface frequency</b>	
<b>Horizontal Frequency</b>	24KHz --80KHz
<b>Vertical Frequency</b>	49Hz -----75Hz
<b>Plug &amp; play:</b>	Support VESA DDC2B functions
<b>Power Input voltage:</b>	Single phase, 50/60HZ, 100 VAC to 240VAC $\pm 10\%$
<b>Total output power:</b>	48 Watt max.

## 2.3 LCD Panel Specification

### 2.3.1 LCD Panel Model (QDI17EL07-01 )

- Display Type active matrix color TFT LCD
- Resolution 1280 x 1024 pixels
- Display Dot 1280 x (RGB) x 1024
- Display Area 337.92mm(H) x 270.34mm(V)
- Pixel Pitch 0.264mm(H) x 0.264mm(V)
- Display Color 16.2M (6 bit color+FRC)
- Lamp Voltage 725 Vrms (typ)
- Lamp Current 7 mArms ( typ)
- Weight 1950g ( typ)
- Optical Specifications

Item		Symbol	Condition	Specification			Unit	Remark
				Min.	Typ.	Max.		
Response time	Rising	T <sub>R</sub>	$\theta = 0^\circ$	-	18	10	ms	-
	Falling	T <sub>F</sub>		-	17	30	ms	
Contrast Ratio		CR	$\theta = 0^\circ$	-	350	-		-
Luminance of White		Y <sub>L</sub>	$\theta = 0^\circ$	200	300	-	nit	-
White Uniformity		$\delta_w$		1.25	1.33	-		-
White Chromaticity		W <sub>x</sub>	$\theta = 0^\circ$	0.283	0.313	0.343		-
		W <sub>y</sub>		0.299	0.329	0.359		
Red Chromaticity		R <sub>x</sub>		0.621	0.651	0.681		
		R <sub>y</sub>		0.290	0.320	0.350		
Green Chromaticity		G <sub>x</sub>		0.270	0.300	0.330		
		G <sub>y</sub>		0.570	0.600	0.630		
Blue Chromaticity		B <sub>x</sub>		0.123	0.153	0.183		
		B <sub>y</sub>		0.079	0.109	0.139		
Vertical Viewing Angle	Up	$\Theta_U$	CR $\geq$ 10	55	65	-	Deg.	-
	Down	$\Theta_D$	CR $\geq$ 10	50	60	-	Deg.	-
Horizontal Viewing Angle	Left	$\Theta_L$	CR $\geq$ 10	65	75	-	Deg.	-
	Right	$\Theta_R$	CR $\geq$ 10	65	75	-	Deg.	-

### 2.3.2 LCD Panel Model (Hydis LT17E12-200)

- Display Type active matrix color TFT LCD
- Resolution 1280x1024 pixels
- Display Dot 1280x (RGB) x 1024
- Display Area 337.92mm(H) x 270.34mm(V)
- Pixel Pitch 0.264mm(H) x 0.264mm(V)
- Display Color 16M (6 bite color+FRC)
- Lamp Voltage 700 Vrms (typ)
- Lamp Current 6.5 mArms (typ)
- Weight 1900g (typ)
- Optical Specifications

$I_L = 6.5\text{mA (RMS)}$     $T_a = 25 \pm 2^\circ\text{C}$     $V_{DD} = 5\text{V}$     $F_V = 60\text{Hz}$     $F_{DCLK} = 54\text{MHz}$

ITEM		Symbol	Condition	MIN.	TYP.	MAX.	UNIT
Contrast Ratio (Center of screen)		CR	$\phi=0,$ $\theta=0$ Normal Viewing Angle	350	430	-	
Response Time at Ta	Rising	T <sub>R</sub>		-	20	-	(total) msec
	Falling	T <sub>F</sub>					
Luminance of white (Center of screen)		Y <sub>L</sub>		200	250	-	cd/m <sup>2</sup>
Color Chromaticity (CIE)	Red	R <sub>X</sub>		0.599	0.629	0.659	
		R <sub>Y</sub>		0.324	0.354	0.384	
	Green	G <sub>X</sub>		0.257	0.287	0.317	
		G <sub>Y</sub>		0.568	0.598	0.628	
	Blue	B <sub>X</sub>		0.115	0.145	0.175	
		B <sub>Y</sub>		0.073	0.103	0.133	
	White	W <sub>X</sub>		0.270	0.300	0.330	
		W <sub>Y</sub>		0.305	0.335	0.365	
Viewing Angle	Hori.	θ <sub>L</sub>	CR≥10	-	80	-	Degrees
		θ <sub>R</sub>		-	80	-	
	Vert.	φ <sub>H</sub>		-	65	-	
		φ <sub>L</sub>		-	65	-	
Brightness Uniformity		B <sub>UNI</sub>		-	-	1.2	
Flicker		F		-	-	5	%
Cross talk		C <sub>T</sub>		-	-	2.0	%

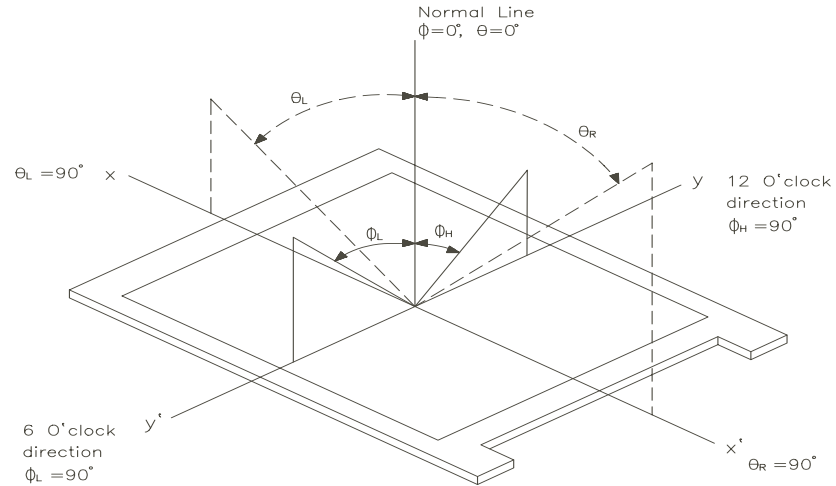
### 2.3.3 LCD Panel Model (Toppoly TD170WGCA1)

- Display Type active matrix color TFT LCD
- Resolution 1280 x 1024 pixels
- Display Dot 1280 x (RGB) x 1024
- Display Area 337.92mm(H) x 270.336mm(V)
- Pixel Pitch 0.264mm(H) x 0.264mm(V)
- Display Color 16.2M (6 bit color+FRC)
- Lamp Voltage 650 Vrms (typ)
- Lamp Current 7 mArms ( typ)
- Weight 1900g ( typ)
- Optical Specifications

Item		Symbol	Condition	MIN	TYP	MAX	Unit	Remarks
Viewing Angle	Hor.	$\Theta$ 11	CR=10 ( At center point )	65	75	--	degree	Note 7-1
		$\Theta$ 12		65	75	--		
	Ver.	$\Theta$ 21		65	75	--		
		$\Theta$ 22		50	60	--		
Contrast ratio (Center point)		CR	$\Theta=0^{\circ}$ $\Phi=0^{\circ}$ Normal Viewing Angle	300	450	--		Note 7-2
Response time	Rising	Tr		--	4	5	ms	Note 7-4
	Falling	Tf		--	12	15		
Luminance of White (Center Point)		Y <sub>L</sub>		200	260	--	cd/m <sup>2</sup>	Note 7-5
Color Chromaticity (CIE1931)	Red	R <sub>x</sub>		0.622	0.652	0.682		Note 7-6
		R <sub>y</sub>		0.303	0.333	0.363		
	Green	G <sub>x</sub>		0.247	0.277	0.307		
		G <sub>y</sub>		0.599	0.629	0.659		
	Blue	B <sub>x</sub>		0.111	0.141	0.171		
		B <sub>y</sub>		0.024	0.054	0.084		
	White	W <sub>x</sub>		0.28	0.31	0.34		
		W <sub>y</sub>		0.30	0.33	0.36		
9 Points White Variation		$\delta$ L		0.7	0.8	--		Note 7-3
Cross Talk		CT		--	--	2.0	%	Note 7-7



Note 1) Definition of Viewing Angle: Viewing angle range ( $10 \leq CR$ )

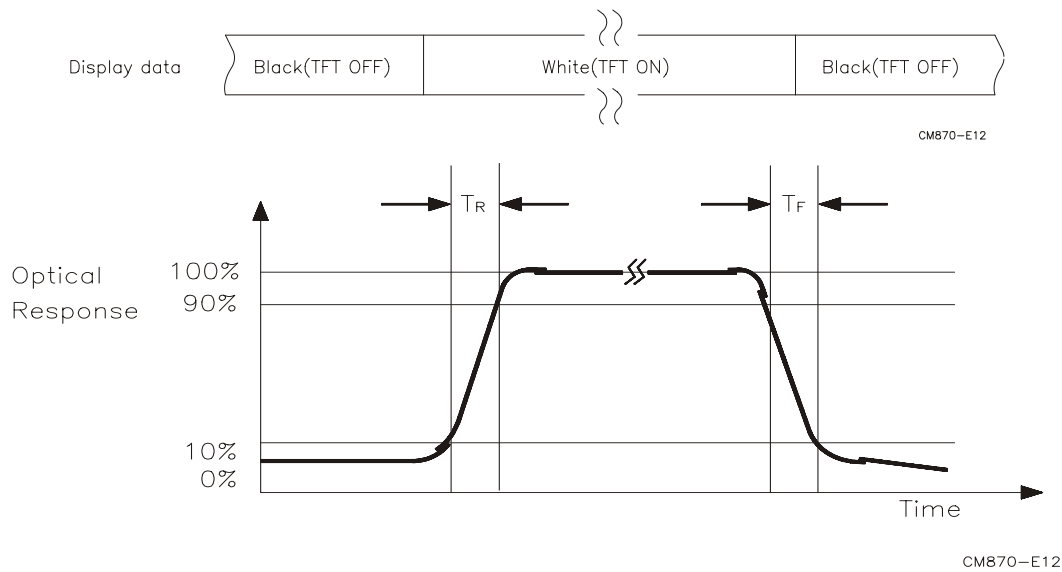


ST350-E01

Note 2) Definition of Contrast Ratio (CR): Ratio of gray max(Gmax),gray min(Gmin) at the center point of panel.

$$CR = \frac{\text{Luminance with all pixels white (Gmax)}}{\text{Luminance with all pixels black (Gmin)}}$$

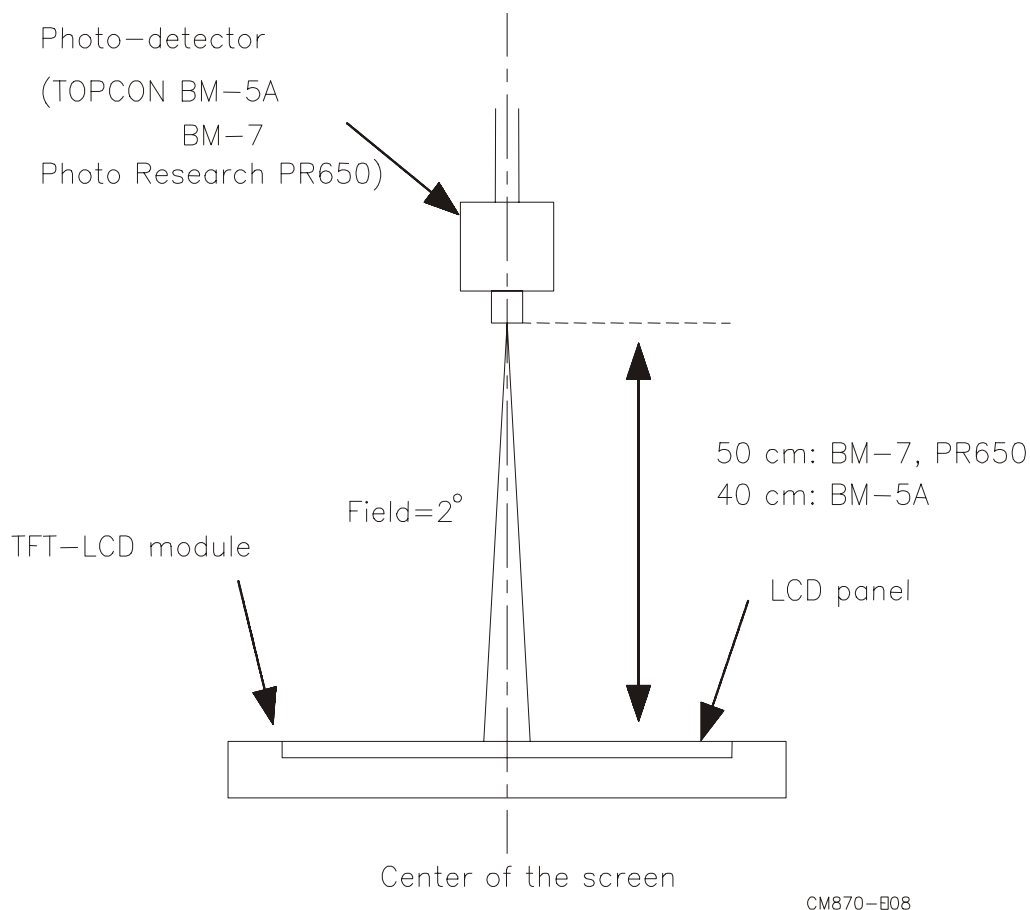
Note 3) Definition of Response time: Sum of  $T_R$ ,  $T_F$



Note 4) After stabilizing and leaving the panel alone at a given temperature for 30 min, the measurement should be executed .Measurement should be executed n a stable,

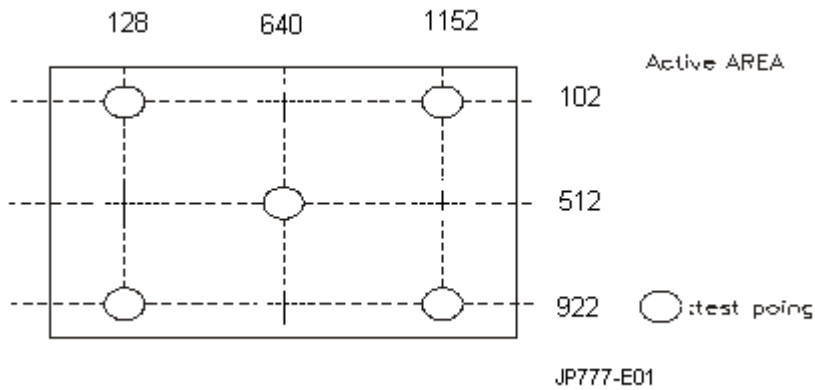
windless ,and dark room.30 min after lighting the back-light. This should be measured in the center of screen. Dual lamp current :13.0mA(6.5mA x2)(Refer to the note(1) in the page 14 for more information ).

Environment condition : $T_a=25\pm 2^{\circ}\text{C}$



## Optical characteristics measurement setup

Notes 5) Definition of Luminance of White : measure the luminance of white at center point.



Notes 6) Definition of 5 points brightness uniformity (Measuring points: Refer to the Note 5)

$$B_{UNI} = 100 * \frac{B_{min}}{B_{max}}$$

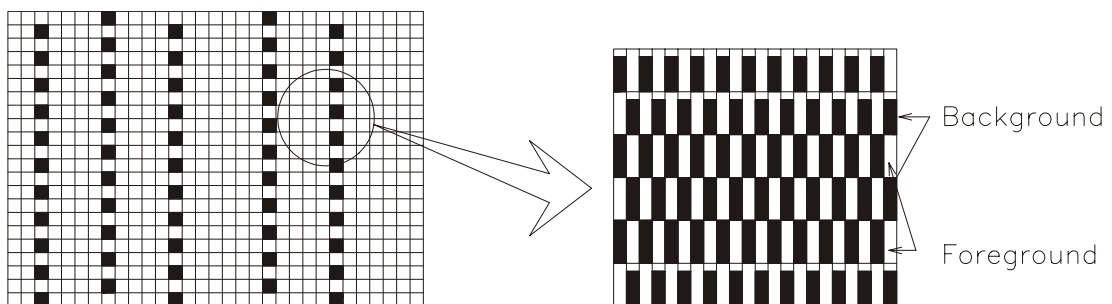
Bmax: Maximum brightness

Bmin: Minimum brightness

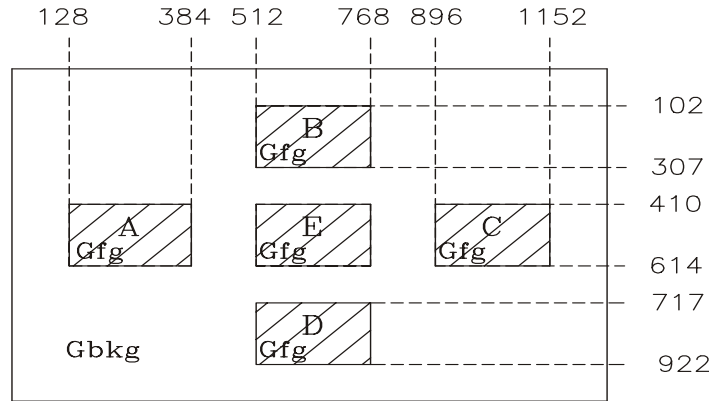
Notes 7) Definition of Flicker level

$$F = \frac{\text{Flicker Voltage}_{pp}}{\text{LMD Voltage}_{dc}} \times 100 \%$$

- ◆ One maximum value of three estimated values.
- ◆ For this test ,an LMD(Light Measurement Device)is needed with adequate response time to track any visible rate flicker component and with a voltage level output proportional To luminance intensity.
- ◆ Test Pattern: For dot inversion Driving(Gray levels of foreground dots on the test panel Are G22,G32,and G45)
- ◆ Test Point :Center point of the display area



Note 8) Definition of Crosstalk (Refer to the VESA STD)



CM870-E10

The calculation for shadowing is made from the 2 luminance measurements Gbkg and Lsh, as follows:

$$C_T = \frac{L_{max} - L_{min}}{L_{min}} \times 100 \%$$

Where Lmax is the larger value of Gbkg or Lsh , and Lmin is the smaller of the two.

- ◆ To determine background and foreground levels (colors), first set the background to any gray scale or color level suitable for shadowing determination. (Note that it may take several iterations of adjusting background level and box levels to determine the proper value for the background. Next display the box levels to determine the proper value for the background level. Look for shadowing in any direction from box E. Independently vary the gray level (or color) of the background and box E until the worst case shadowing is observed. This defines the background (Gbkg) and foreground (Gfg) levels to be maintained for the remainder of the test.
- ◆ One point only (the target) will be measured. To determine that point proceed as follows Using the background and foreground gray levels of step1 (Gbkg and Gfg). Turn on each box at a time. Look for the case with the worst shadowing. The box causing the worst case is the shadowing source, or Bsrc. Use Bsrc and the box opposite from it that lies directly in the shadow path. That is the target box, or Btgt. Note that box E might be either Bsrc or Btgt, depending on the shadowing conditions, but typically Bsrc and Btgt will be a pair of opposite boxes, A&C or B&D. Btgt will only be displayed for aligning the LMD. It will be turned off for the actual measurement.
- ◆ The target box point (Btgt) will be measured with the source box (Bsrc) turned on then off. (Btgt is for alignment purpose only) Display the background only at level Gbkg. Display Btgt determined in step 2 above. Using the correct distance, angle, and measurement aperture, align the LMD to the center of the Btgt. Turn off Btgt. With Gbkg set to its proper level, measure the luminance (or color). Next, turn on the source box Bsrc. Again measure at the center point of Btgt (without Btgt present.). In this case the LMD will be measuring the shadowing level, Lsh.

## **2.4 Input Signals**

### **2.4.1 Video input**

- Type Analog R, G, B.
- Input Impedance 75 ohm +/- 2%
- Polarity Positive
- Amplitude 0 - 0.7 +/- 0.05 Vp
- Display Color same as LCD panel

### **2.4.2 Sync input**

- Signal separate horizontal and vertical sync, or composite sync which are TTL compatible
- Polarity positive and negative.

### **2.4.3 Interface frequency**

The following frequency range is generalized by supported timing. If the entered mode does not match the supported timing the display optimization will not be assured.

- Horizontal Frequency 24KHz --80KHz(analog)
- Vertical Frequency 49Hz -----75Hz

## Supported Timing

TIMING	FH(KHZ) FV(HZ)	SYNC POLARITY	TOTAL (DOT/LINE)	ACTIVE (DOT/LINE)	SYNC WIDTH (DOT/LINE)	FRONT PORCH (DOT/LINE)	BACK PORCH (DOT/LINE)	PIXEL FOREQ.(MHZ)
640x350	31.469	+	800	640	96	16	48	25.175
VGA-350	70.087	-	449	350	2	37	60	
640x400	24.83	-	848	640	64	64	80	21.05
NEC PC9801	56.42	-	440	400	8	7	25	
640x400	31.469	-	800	640	96	16	48	25.175
VGA-GRAPH	70.087	+	449	400	2	12	35	
640x400	31.5	-	800	640	64	16	80	25.197
NEC PC9821	70.15	-	449	400	2	13	34	
640X480	31.469	-	800	640	96	16	48	25.175
VESA-PAL	50.030	-	629	480	2	62	85	
640x480	31.469	-	800	640	96	16	48	25.175
VGA-480	59.94	-	525	480	2	10	33	
640x480	35.00	-	864	640	64	64	96	30.24
APPLE MAC-480	66.67	-	525	480	3	3	39	
640x480	37.861	-	832	640	40	16	120	31.5
VESA-480-72Hz	72.809	-	520	480	3	1	20	
640x480	37.5	-	840	640	64	16	120	31.5
VESA-480-75Hz	75	-	500	480	3	1	16	
720x400	31.469	-	900	720	108	18	54	28.322
VGA-400-TEXT	70.087	+	449	400	2	12	35	
832x624	49.725	-	1152	832	64	32	224	57.2832
APPLE MAC-800	74.55	-	667	624	3	1	39	
800x600	35.156	+	1024	800	72	24	128	36
SVGA	56.25	+	625	600	2	1	22	
800x600	37.879	+	1056	800	128	40	88	40
VESA-600-60Hz	60.317	+	628	600	4	1	23	
800x600	48.077	+	1040	800	120	56	64	50
VESA-600-72Hz	72.188	+	666	600	6	37	23	
800x600	46.875	+	1056	800	80	16	160	49.5
VESA-600-75Hz	75	+	625	600	3	1	21	
1024x768	48.363	-	1344	1024	136	24	160	65
XGA	60.004	-	806	768	6	3	29	
1024x768	53.964	+	1328	1024	176	16	112	71.664
COMPAQ-XGA	66.132	+	816	768	4	8	36	
1024x768	56.476	-	1328	1024	136	24	144	75
VESA-768-70Hz	70.069	-	806	768	6	3	29	
1024x768	60.023	+	1312	1024	96	16	176	78.75
VESA-768-75Hz	75.029	+	800	768	3	1	28	
1024x768	60.24	-	1328	1024	96	32	176	80
APPLE MAC-768	75.02	-	803	768	3	3	29	
1152x864	54.054	+	1480	1152	96	40	192	80
(60Hz)	59.270	+	912	864	3	13	32	
1152x864	63.851	+	1480	1152	96	32	200	94.499
(70Hz)	70.012	+	912	864	3	1	44	
1152x864	67.50	+	1600	1152	128	64	256	108.00
(75Hz)	75.00	+	900	864	2	2	32	
1280x960	60.00	+	1800	1280	112	96	312	108.00
(60Hz)	60.00	+	1000	960	3	1	36	
1280x960	70.00	+	1800	1280	112	96	312	126.00
(70Hz)	70.00	+	1000	960	3	1	36	
1280x960	75.00	+	1800	1280	112	96	312	135.00
(75Hz)	75.00	+	1000	960	3	1	36	
1280x1024	64	+	1688	1280	112	48	248	108
VESA-1024-60Hz	60	+	1066	1024	3	1	38	
1280x1024	80	+	1688	1280	144	16	248	135
VESA-1024-75Hz	75	+	1066	1024	3	1	38	

#### 2.4.4 85Hz refresh rate Support

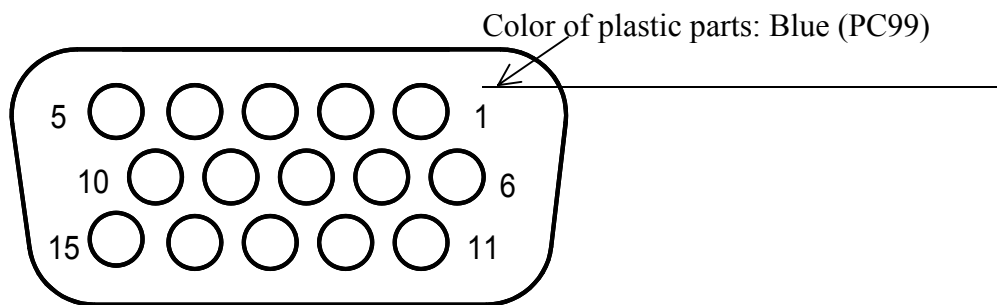
Monitor should display 85Hz refresh rate mode as emergency mode.  
Monitor should display “Out of Range” warning menu at this mode.

#### 2.4.5 Video input Connector

Analog Video input Connector: 15pins mini D-Sub

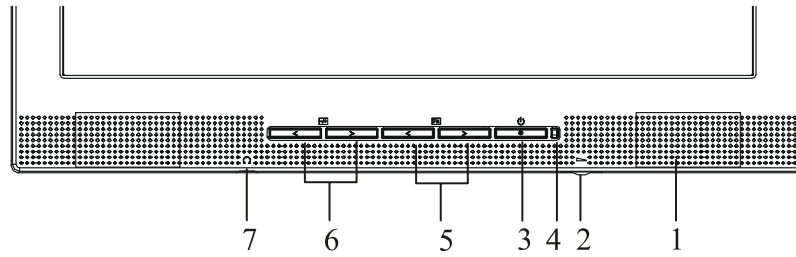
Table 2.4.5. Pin assignment for D-sub connector

PIN NO.	Separate Sync
1	RED VIDEO
2	GREEN VIDEO
3	BLUE VIDEO
4	GROUND
5	GROUND
6	RED GROUND
7	GREEN GROUND
8	BLUE GROUND
9	PC5V (+5V DDC)
10	CABLE DETECTION
11	GROUND
12	SDA
13	H.SYNC
14	V.SYNC
15	SCL



D-sub connector

## 2.5 CONTROLS



### 2.5.1 Control panel (monitor front panel)

1. Stereo Speakers (EP577)
2. Speaker Volume Control (EP577)
3. Soft Power Switch
4. DC Power-On Indicator
5. Function select Buttons
6. Adjustment Control Buttons
7. External Headphone Jack (EP577)

*Note: When OSD Menu is off, press button 2 and 3 at the same time can activate "Auto Adjustment" immediately.*

### 2.5.2 OSD Functions

- OSD Format: Refer to following figure.
- OSD Border: Cyan color
- OSD Tunable Item: The 16 icons that around the border.
- Selected Item: Yellow background
- Comment: Magenta foreground, Blue background

*page format :*





*Description:*

- Brightness: Brightness adjustment, the range from 0 to 100. Default = 80
- Contrast: Contrast adjustment, the range from 0 to 100. Default = 80
- H. Position: Horizontal position adjustment.
- V. Position: Vertical position adjustment.
- Phase: Focus adjustment, the range from 0 to 100 steps.
- OSD position: OSD position adjustment.
- Auto Adjustment: This feature will automatically adjust size, position, clock and phase.  
It takes 3-5 seconds to finish. When auto start, it shows “Auto Adjusting....” message.
- Clock: Frequency tracking adjustment. The max range from -50 to +50, but some modes the range will be limited.
- Graph Text: 640x400(GRAPH) or 720x400(TEXT) mode select.
- Language: 8 kinds of language for description, including (English, German, French, Spanish, Italian, Pyccknn~, 日本語, 简体中文)
- Recall: Recall the default value.
- Color Temp: Color temperature for standard 9300,6500, 7500 or user defined.
  - User:
    - User R: Red signal gain by user defined.
    - User G: Green signal gain by user defined.
    - User B: Blue signal gain by user defined.
  - 7500: Set CIE coordinate at 7500°K color temperature.
  - 6500: Set CIE coordinate at 6500°K color temperature.
  - 9300: Set CIE coordinate at 9300°K color temperature.
- Exit: Exit OSD menu function.

Sharpness : Adjust the scale-up effect(smooth or sharper.)

OSD Transparency: Adjust the transparency level of OSD. The range is from 0 to 10 scales.

*Comment:*

- 1280x1024: Current mode resolution.
- 60 HZ: Current mode vertical frequency±1Hz.
- VER 1.00: Firmware revision.

- Other features:

- Intellectual-Auto EP577/578 can start the Auto-Adjustment automatically when input a new display mode at first time. After the adjustment, EP677/678 will remember this mode and switch to optimized condition automatically for this mode whenever encounter this mode again. Total 28 recent used modes are recorded into EEPROM
- VESA DPMS Functionality When signaled by the host CPU, EP577/578 show a black screen about 3 seconds. If no further signal, then it shows “No Signal” and enter power saving mode.

## 2.6 White Color Temperature

White color temperature is 4 preset as 9300, 7500, 6500 and User,  
Default value of user color should be user which is maximum setting for panel.

Target of color setting

Color Temp.	Color Coordinate		Tolerance	Color Coordinate		Tolerance
	x	y		u'	v'	
9300K	0.283	0.297	$\pm 0.03$	0.189	0.446	$\kappa u'v' \leq 0.01^*$
7500K	0.299	0.315	$\pm 0.03$	0.194	0.459	$\kappa u'v' \leq 0.01^*$
6500K	0.313	0.329	$\pm 0.03$	0.198	0.468	$\kappa u'v' \leq 0.01^*$
User	-	-		-	-	-

\*) TCO'0X A.2.6.1 requirement

User should follow “Microsoft Windows Color Quality Specification for Liquid Crystal Display OEM’s”.  
(<http://www.microsoft.com/hwdev/tech/color/ColorTest.asp>)

## 2.7 POWER SUPPLY

### 2.7.1 input Voltage Range

The monitor shall operate within specification over the range of 90 to 265 VAC power supply.

### 2.7.2 Input Frequency Range

Input power frequency range shall be from 47.5 to 63 Hz over the specified input voltage range.

### 2.7.3 Quick specification review

- Input current  
1.2A (max) at 90VAC input and full load ,  
0.6A (max) at 264 VAC input and full load.
- Inrush current @ cold start  
30A(0-peak)@ 110Vac ,50A(0-peak) @ 220Vac  
(measured when switched off for at least 10 mins.)

- Output

	Tolerance	Output Current		Volt Tolerance
Output Volt	-	MIN	MAX	
+5Vdc	±5%	0A	1.0A	4.8~5.2V dc (for EP577)
+5Vdc	±5%	0.05A	1.5A	4.8~5.2V dc
+13Vdc	+25%/-10%	0A	2.2A	11.7~16.25Vdc

- Total output power: 48 Watt max. for EP577  
40 Watt max. for EP578
- Withstanding voltage : 1.5Kvac or 2.2KVdc for 1 minute.
- Leakage current : < 0.25mA/100Vac , <3.5mA/230Vac
- Efficiency : 70% min. @115V/230VAC, maximum load.

## 2.7.4 Power Management

### 2.7.4.1 Meet VESA DPMS proposal

The monitor must comply with the Microsoft On Now specification, with a minimum of three power management states, as defined by the VESA DPMS document. The front panel of the monitor must appropriately display the DPMS state, For example:

DPMS ON :                   The power LED is Green  
DPMS OFF :                 The power LED is Amber

### 2.7.5 Power Consumption

On mode	40 Wmax (EP578) 48 Wmax (EP577)	Green
Off mode	3 Wmax	Amber
DC power off	3 Wmax	Dark
disconnection	3 Wmax	Dark (DC power off) Amber (DC power on)

- ◆ Power saving states are measured with speakers attached but not worked.
- ◆ The recovery time from stand by /suspend/off mode to on mode is 3 seconds maximum.

### 2.7.6 Power Connector

All units shall have an IEC/CEE-22 type male power receptacle.

## 2.8 Plug & Play(EDID)

The monitor will be capable of sending a VESA standardized EDID file through the DDC (pins 12, 15 of the VGA connector).

## 2.9 Audio Technical specification (EP577 Only)

### 2.9.1 General Description:

Output power : 1W + 1W maximum  
Total harmonic distortion : Less than 1 % (except speakers distortion)  
Input signal sensitivity : 0.5 Vrms for full output  
Input impedance : 47 Kohm +/- 5 %  
Frequency response range : 100Hz – 20kHz (except speakers response)  
Difference of L and R output : Less than 2 dB

### 2.9.2 Electrical characteristics (Tamb=25 °)

Audio amplifier(USE Panasonic VP-7723A Audio Analyzor. )

Item	Audio Input	Freq.	Spec.			Comment
			Min.	Typ.	Max.	
Input Voltage(Vrms)			-	0.5	-	
Input Current(m A)			-	500	800	
Audio Voltage Gain	500m Vrms	1KHz	-	-	6 d B	Volume Max.,load 4 Ω
Frequency Response	500m Vrms	300Hz-20KHz	-10dB	-	+10d B	Volume Max.,load 4 Ω
Signal to Noise ratio	500m Vrms	1KHz	-	-	-40dB	Volume Max.,load 4 Ω
Total harmonic distortion	500m Vrms	1KHz			1%	except speakers distortion
Cross talk	500m Vrms	1KHz	-	-	-30dB	Volume Max.,load 4 Ω
Output Watt.	500m Vrms	1KHz	-	-	1W	Volume Max.,load 4 Ω
Volume Control			-	-	-	Analog

### **2.9.3 *Speakers***

Maximum power	: 1 W per speaker(max)
Impedance	: 4 ohm +/- 15 % @ 1kHz 1.0Hz
Frequency response range	: 300 Hz – 20 kHz (S.P.L. – 10 dB)
Total harmonic distortion	: Less than 5 % @ 0.125 W 1kHz

### **2.9.4 *Headphone output***

Output power	: 1.6 mW for 32 ohms Headphone
--------------	--------------------------------

## **3. VL-731 DISPLAY CONTROL BOARD**

### **3.1 Description**

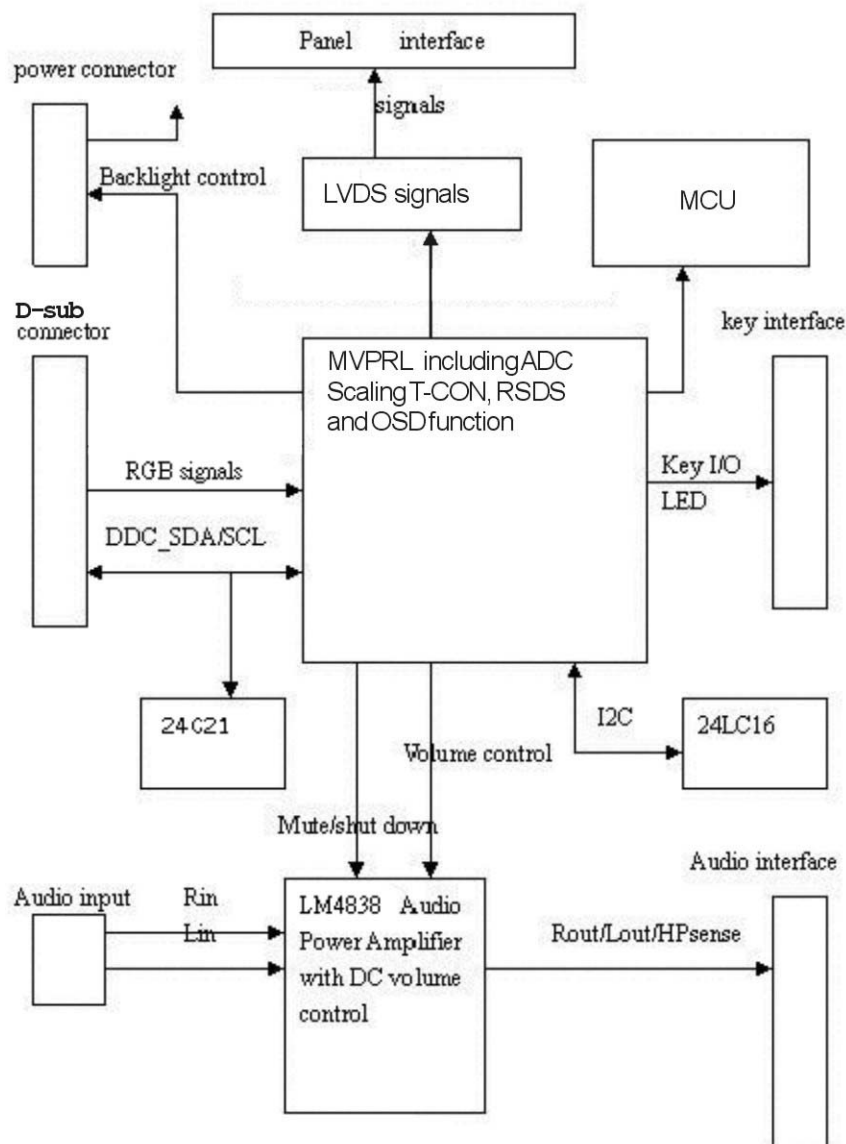
The VL-731 display control board is design to directly receive R, G, B Analog signal to optimum LCD timing signals so as to construct a high display quality LCD monitor.

### **3.2 Features**

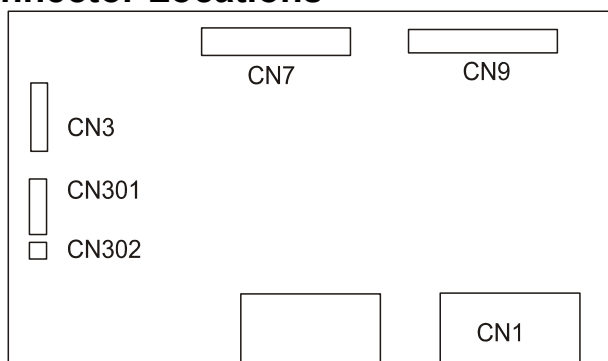
- Support for image expansion and reduction.
- On board micro-processor to detect display timings and control user functions.
- Using Genesis design to generate optimum LCD timings.
- Using E<sup>2</sup>PROM to memorize every adjusted parameter.
- Support up to 28 display modes from VGA to SXGA.
- Offer full screen expansion function on non-XGA mode (automatic).
- Support OSD functions.
- Support VESA DPMS function.
- Support DDC2B functions.
- Support English and Japanese language for OSD description.
- The longest time for mode change is 3 seconds.

### 3.3 BLOCK DIAGRAM

**System Block Diagram**



### 3.4 Connector Locations



### 3.5 Connector Type

Location	Type	Maker	Number of pins
CN3	96113-0803	E&T	8
CN6	4501-10	E&T	10
CN302	98115-0313	E&T	3
CN301	4300-11P	E&T	11
CN1	D-SUB	E&T	15
CN7	DF14-30P-1.25H	HRS	30

### 3.6 Signal Pin & Description

#### 3.6.1 CN7

Pin NO.	Symbol	Description
1	RXO0-	LVD ODD 0 - SIGNAL
2	RXO0+	LVD ODD 0 + SIGNAL
3	RXO1-	LVD ODD 1 - SIGNAL
4	RXO1+	LVD ODD 1 + SIGNAL
5	RXO2-	LVD ODD 2 - SIGNAL
6	RXO2+	LVD ODD 2 + SIGNAL
7	GND	Ground
8	RXOCLK-	LVD ODD CLOCK - SIGNAL
9	RXOCLK+	LVD ODD CLOCK + SIGNAL
10	RXO3-	LVD ODD 3 - SIGNAL
11	RXO3+	LVD ODD 3 + SIGNAL
12	RXE0-	LVD EVEN 0 - SIGNAL
13	RXE0+	LVD EVEN 0 + SIGNAL
14	GND	Ground
15	RXE1-	LVD EVEN 1 - SIGNAL
16	RXE1+	LVD EVEN 1 + SIGNAL
17	GND	Ground
18	RXE2-	LVD EVEN 2 - SIGNAL
19	RXE2+	LVD EVEN 2 + SIGNAL
20	RXECLK-	LVD EVEN CLOCK - SIGNAL
21	RXECLK+	LVD EVEN CLOCK + SIGNAL
22	RXE3-	LVD EVEN 3 - SIGNAL
23	RXE3+	LVD EVEN 3 + SIGNAL
24	GND	Ground
25	NC	NO CONNECTION
26	DE	NO CONNECTION
27	NC	NO CONNECTION
28	VDD	POWER SUPPLY (+5.0V)
29	VDD	
30	VDD	



### 3.6.2 CN302

Pin No.	Signal	Comment
1	Audio-RIN	Audio Right Input
2	GND	
3	Audio-LIN	Audio Left Input

### 3.6.3 CN301

Pin No.	Signal	Comment
1	+5 VDD	Audio +5V
2	VR	Audio Volume Control
3	L+	Audio Left+ Output
4	L-	Audio Left- Output
5	AGND	Analog GND
6	HP-S	HP-Sense
7	HP-L	Audio Left Output (Head Phone)
8	HP-R	Audio Right Output (Head Phone)
9	AGND	Analog GND
10	R+	Audio Right+ Output
11	R-	Audio Right- Output

### 3.6.4 CN6

Pin NO.	Signal	Comment
1	+5 V	Audio Power
2	GND	Audio GND
3	GND	GND
4	GND	GND
5	BRIGHT	Brightness Adjustment
6	PS	Power Saving
7	PBIAS	Back Light ON/OFF
8	+5VB	From USB power
9,10	+5V	From main power

### 3.6.5 CN3

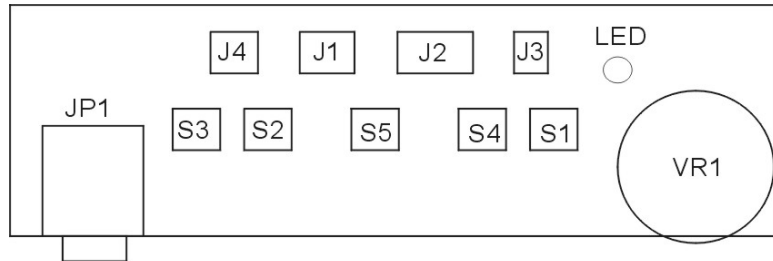
Pin NO.	Signal	Comment
1	LED-Y	Power saving mode
2	LED-G	Monitor is ON
3	GND	GND
4	KEY-ON/OFF	KEY- ON/OFF
5	KEY-UP	KEY-Brightness Increase
6	KEY-DOWN	KEY-Brightness Decrease
7	KEY-RIGHT	KEY-Volume Increase
8	KEY-LEFT	KEY-Volume Decrease

## 4. VK-720 (EP578)/ VK-723 (EP577) Control Panel Board

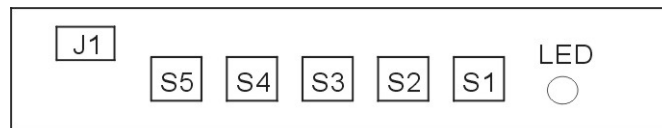
### 4.1 Description

The VK-713 is designed to offer a user interfaced control panel which passes and receives signals to and from VK-713 display control board.

### 4.2 Connector and Switch Locations



VK-723



VK-720

### 4.3 Connector type (VK-723)

Location	Type	Maker	Number of pins
J4,J1((VK-720)	4301-08	E&T	8
J2	4301-11	E&T	11
J1	87502-0200	ACER	2
J3	87502-0200	ACER	2
JP1	SCJ-0348-C	SC	5

### 4.4 Connector pin Assignment(VK-723)

#### 4.4.1 J4,J1(VK-720)

Pin NO.	Signal	Comment
8	KEY-LEFT	Function select counter-clockwise
key		
7	KEY-RIGHT	Function select counter-clockwise key
6	KEY-DOWN	Adjust down key
5	KEY-UP	Adjust up key
4	KEY-POWER	Power ON/OFF key
3	GND	GND
2	LED-G	Power is ON
1	LED-Y	Power is OFF

#### 4.4.2 J2

<i>Pin NO.</i>	<i>Signal</i>	<i>Comment</i>
1	+5 VDD	Volume Control
2	Volume	Volume Control
3	L OUT+	Audio Output L+
4	L OUT-	Audio Output L-
5	AGND	Audio GND
6	HP-S	Audio Earphone sensor
7	HP-L	Audio Earphone Output L
8	HP-R	Audio Earphone Output R
9	AGND	Audio GND
10	R OUT-	Audio Output R+
11	R OUT+	Audio Output R-

#### 4.4.3 J3

<i>Pin NO.</i>	<i>Signal</i>	<i>Comment</i>
2	L+ OUT	Audio Output L+
1	L- OUT	Audio Output L-

#### 4.4.4 J1

<i>Pin NO.</i>	<i>Signal</i>	<i>Comment</i>
2	R+ OUT	Audio Output R+
1	R-OUT	Audio Output R-

#### 4.5 Switch definition(VK-723)

<i>Location</i>	<i>Definition</i>
S1	Power ON/OFF
S4,S2(VK-720)	Function select by clockwise direction
S5,S3(VK-720)	Function select by counter-clockwise direction
S2,S4(VK-720)	Adjust up
S3,S5(VK-720)	Adjust down

#### 4.6 LED definition

<i>Location</i>	<i>Definition</i>
D1	Green for ON mode; Yellow for OFF mode; yellow for Power Saving mode; Dark for DC power OFF mode.

## 5. POWER SUPPLY & INVERTER BOARD

### 5.1 Description

The Power supply and Inverter board is designed for Display control board and lighting up the back-lights of LCD module.

### 5.2 Power supply ( AC to DC section)

#### 5.2.1 input Voltage Range

The monitor shall operate within specification over the range of 90 to 265 VAC power supply.

#### 5.2.2 Input Frequency Range

Input power frequency range shall be from 47.5 to 63 Hz over the specified input voltage range.

#### 5.2.3 Quick specification review

- Input current  
1.2A (max) at 90VAC input and full load ,  
0.6A (max) at 264 VAC input and full load.
- Inrush current @ cold start  
30A(0-peak)@ 110Vac ,50A(0-peak) @ 220Vac  
(measured when switched off for at least 10 mins.)

- Output

	Tolerance	Output Current		Volt Tolerance
Output Volt	-	MIN	MAX	
+5Vdc	±5%	0A	1.0A	4.8~5.2V dc (for EP577)
+5Vdc	±5%	0.05A	1.5A	4.8~5.2V dc
+13Vdc	+25%/-10%	0A	2.2A	11.7~16.25Vdc

- Total output power: 48 Watt max. for EP577  
40 Watt max. for EP578
- Withstanding voltage : 1.5Kvac or 2.2KVdc for 1 minute.
- Leakage current : < 0.25mA/100Vac , <3.5mA/230Vac
- Efficiency : 70% min. @115V/230VAC, maximum load.

### 5.3 Inverter (DC to AC Section)

### 5.4 Electrical characteristics

#### 5.4.1 FOR Hydix PANEL (HT17E12-200)

	MIN.	TYP.	MAX.	COMMENT
INPUT VOLTAGE	11.4V	13V	16.25V	13V+25%/-10%
INPUT CURRENT	-----	2A	-----	Vin=13V,Vbrite=3.3V
Normal BACKLIGHT VOLTAGE	-----	705Vrms	-----	
LAMP CURRENT (every lamp)	3mArms	6.5mArms	7mArms	Each CCFL
DRIVING FREQUENCY	40KHz	-----	60KHz	
EFFICIENCY	-----	75%	-----	Vin = 13V,max brightness
Vin ON/OFF sequence	-----	0.5S	-----	
OLP TIME	-----	1S	-----	Open lamp protection time
BRIGHTNESS RANGE	30%	-----	100%	
Brightness control	0.4V	—	3.3V	3.3V, brightness max.
Brightness	—	250cd/m <sup>2</sup>	—	
Strike voltage at 0°C	1310Vrms	—	—	
Operating life time	40,000 hrs	50,000	—	(note)

Note:

Life time (hr) can be defined as the time in which it continues to operate under the condition:

Ta=25±2°C, IL =6.5mArms until one of the following event occurs:

1. When the brightness becomes 50 %
2. When the startup voltage (Vs) at 0°C becomes higher than the maximal value of Vs specified above.

#### 5.4.2 FOR QDI PANEL (QD17EL07)

	MIN.	TYP.	MAX.	COMMENT
INPUT VOLTAGE	11.4V	13V	16.25V	13V+25%/-10%
INPUT CURRENT	-----	2A	-----	Vin=13V,Vbrite=3.3V
Normal BACKLIGHT VOLTAGE	-----	725Vrms	-----	
LAMP CURRENT (every lamp)	3mArms	7mArms	7.5mArms	Each CCFL
DRIVING FREQUENCY	35KHz	-----	70KHz	
EFFICIENCY	-----	75%	-----	Vin = 13V,max brightness
Vin ON/OFF sequence	-----	0.5S	-----	
OLP TIME	-----	1S	-----	Open lamp protection time
BRIGHTNESS RANGE	30%	-----	100%	
Brightness control	0.4V	—	3.3V	3.3V, brightness max.
Brightness	200 cd/m <sup>2</sup>	300cd/m <sup>2</sup>	—	
Strike voltage at 0°C	1420Vrms	—	—	
Operating life time	40,000 hrs	50,000	—	(note)

Note:

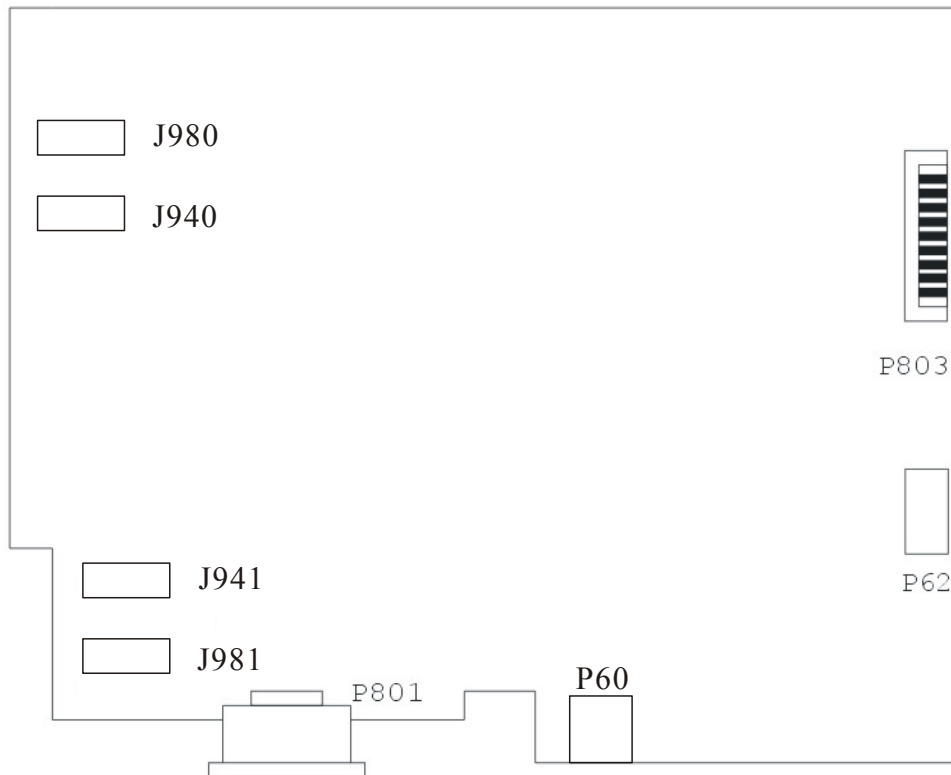
Life time (hr) can be defined as the time in which it continues to operate under the condition:

Ta=25±2°C, IL =7mArms until one of the following event occurs:

1. When the brightness becomes 50 %
2. When the startup voltage (Vs) at 0°C becomes higher than the maximal value of Vs specified above.

## 5.5 Connector locations

### 5.5.1 Connector type



Location	Type	Maker	Number of pins
J940, J941, J980, J981	SM02B-BHSS-1	JST	2
P803	96113-1203	E&T	10P
P801	SA-4S-066	AC Inlet	3
P60	SCJ03451X9	SC	3
P62	98115-0313	E&T	3

### 5.5.2 Connector pin assignment

#### 5.5.2.1 J980, J981, J940, J941

Pin NO.	Signal	Comment
1	HV	High voltage for lamp
2	LV	Low Voltage for lamp

#### 5.5.2.2 P803 For Display control board (Interface)

Pin NO.	Signal	Comment
1	+5Vaudio	+5Vdc for Audio ckt
2	GND/Audio	Ground for Audio ckt
3,4	GND	Common Ground

5	<i>BRITE</i>	<i>Brightness adjustable range: 0.4V&lt;min&gt;~3.3V&lt;max&gt;</i>
6	<i>N.C.</i>	
7	<i>Enable</i>	<i>Backlight ON/OFF control (Active High) ON:1.5~5.5V OFF:-0.3~1.0V.</i>
8,9,10	<i>Vcc</i>	<i>+5Vdc supply to Interface BD, always on.</i>

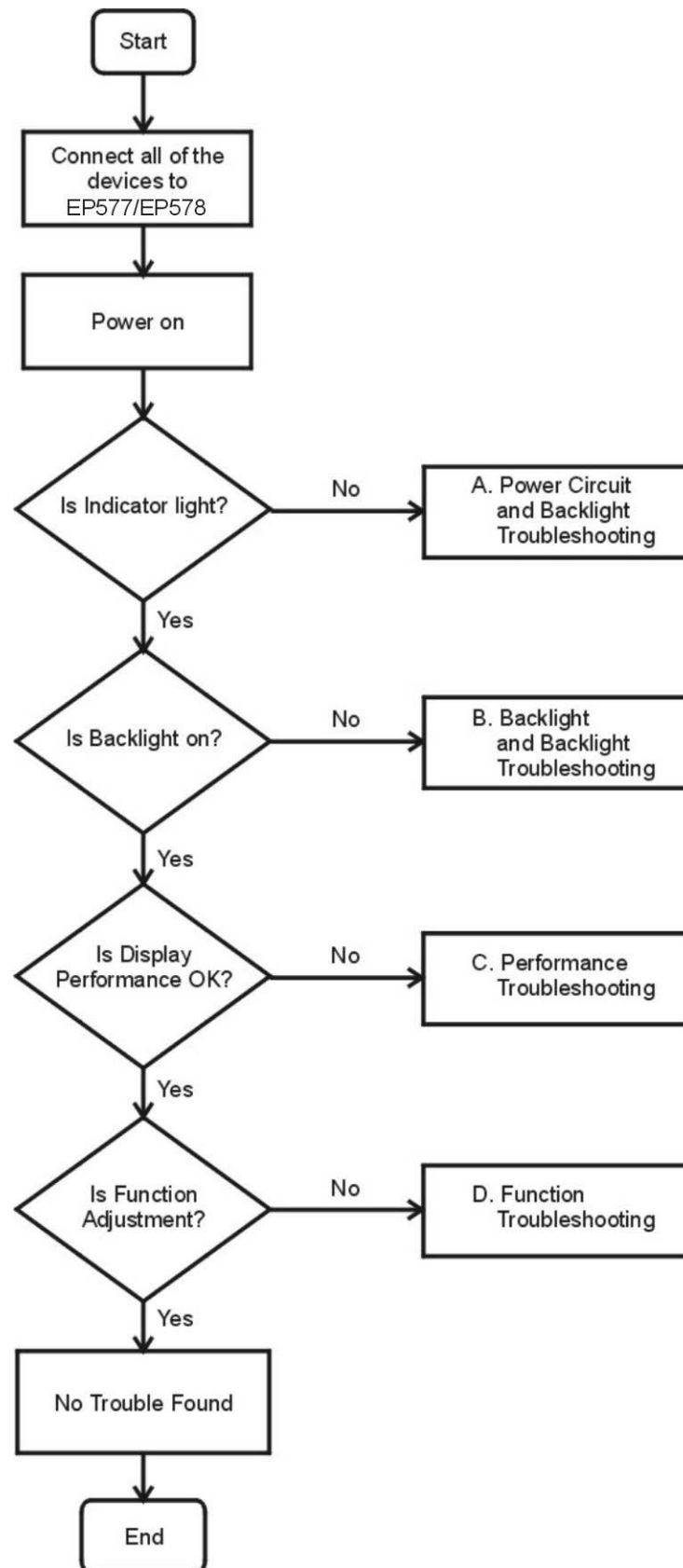
#### **5.5.2.3 P60 / P62 For EP577**

<i>Pin NO.</i>	<i>Signal</i>	<i>Comment</i>
<i>1</i>	<i>Audio-RIN</i>	<i>Audio Right Input</i>
<i>2</i>	<i>GND</i>	
<i>3</i>	<i>Audio-LIN</i>	<i>Audio Left Input</i>

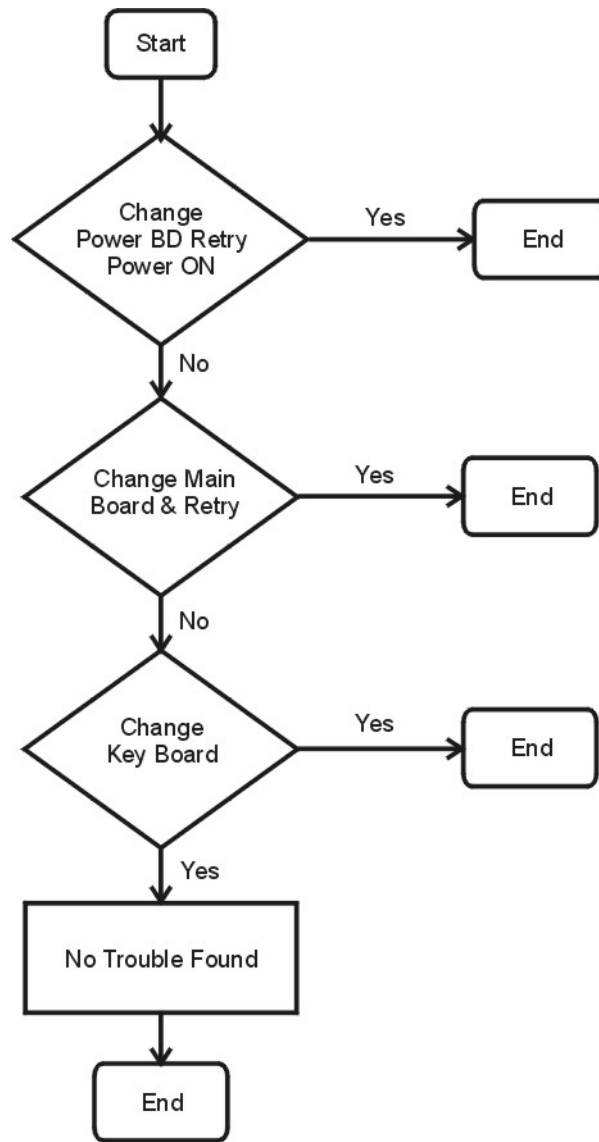


# 6. TROUBLESHOOTING

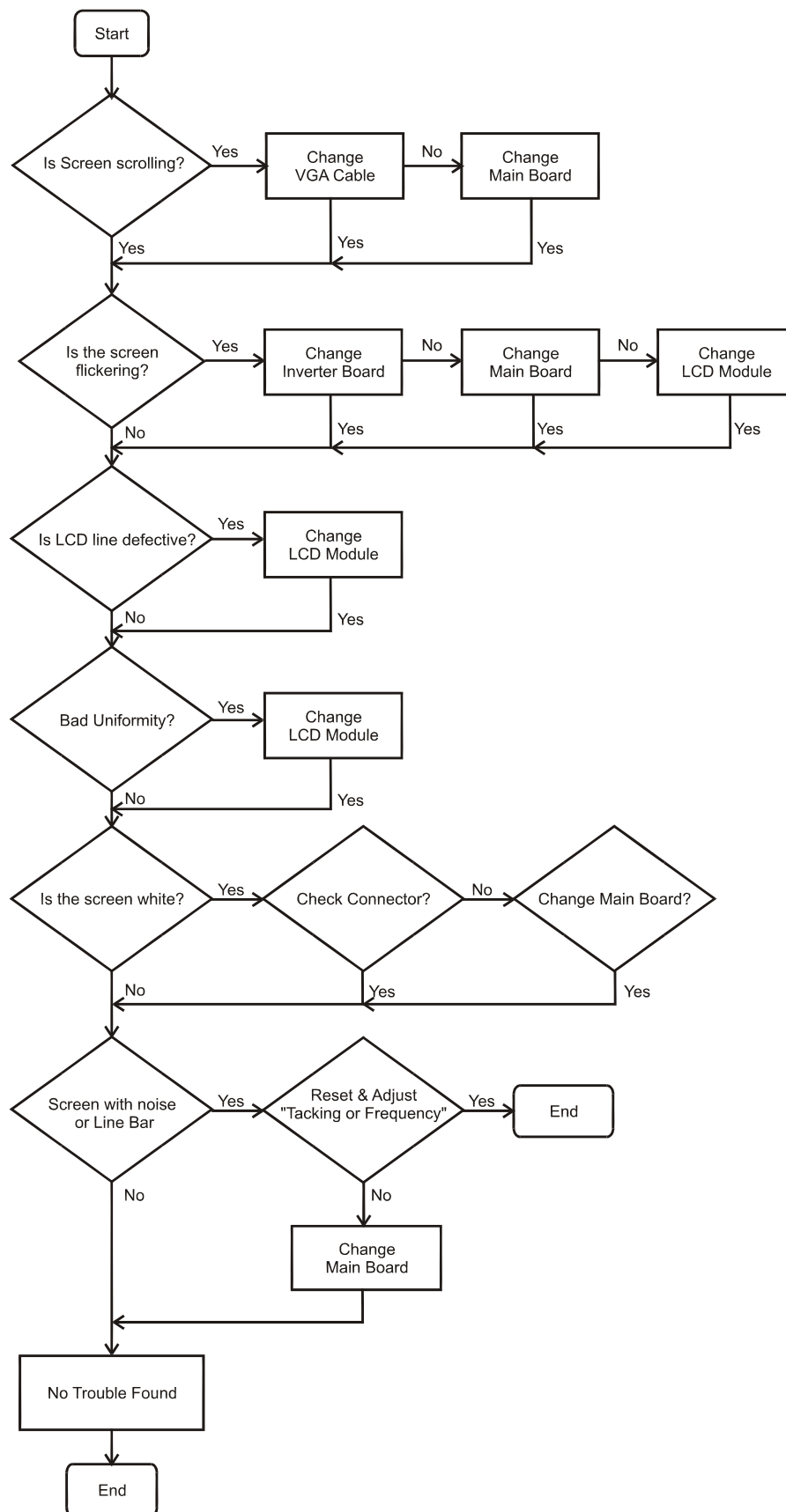
## 6.1 Main Procedure



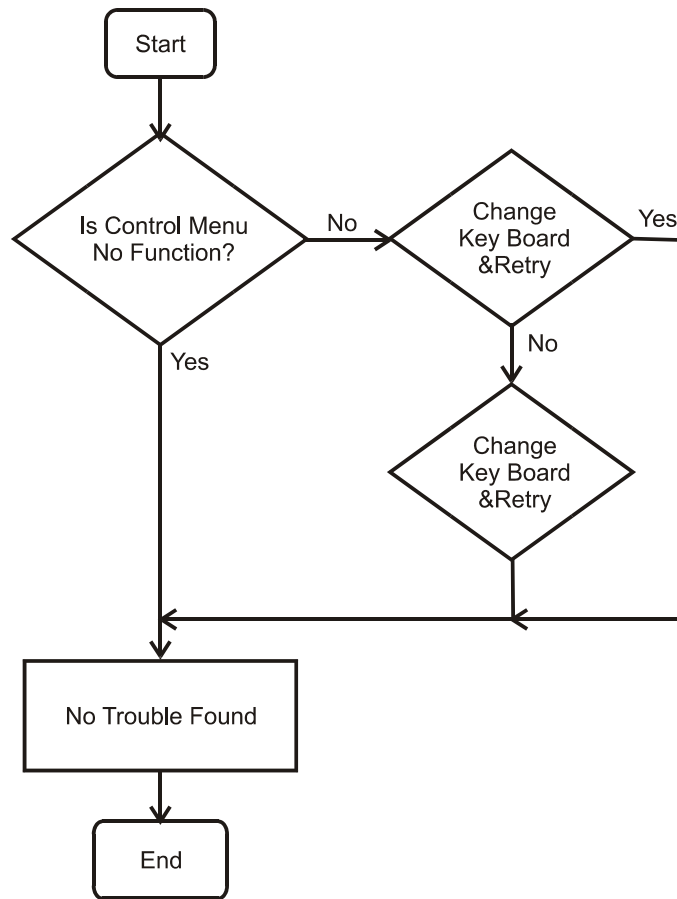
### 6.1.1 Power Circuit and Backlights Troubleshooting

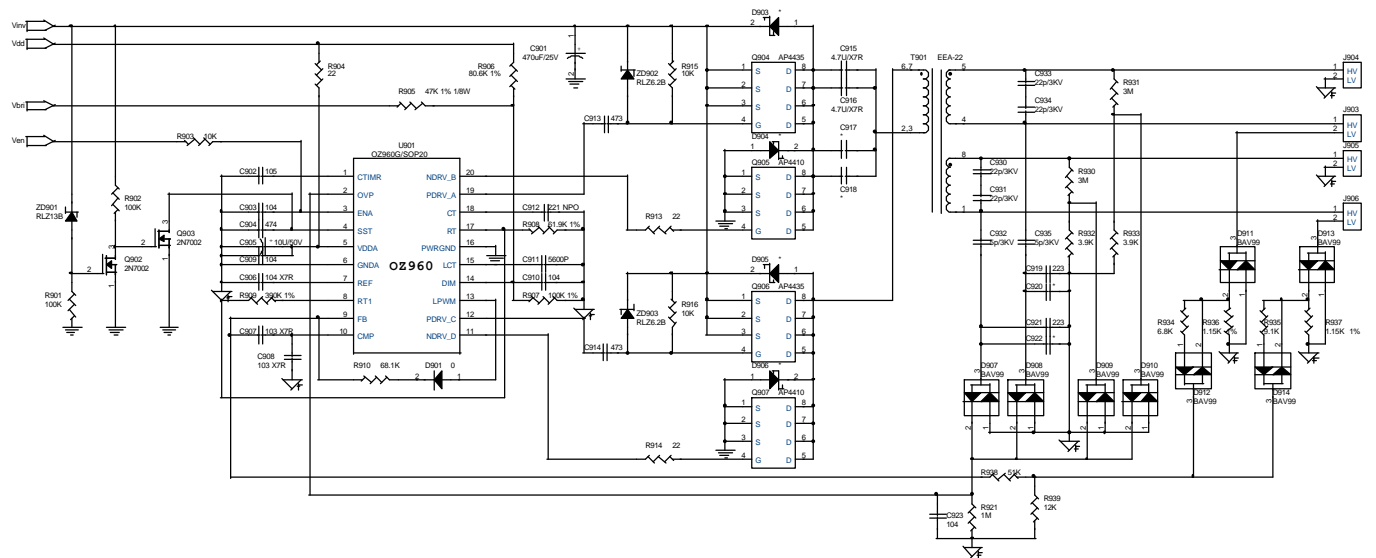
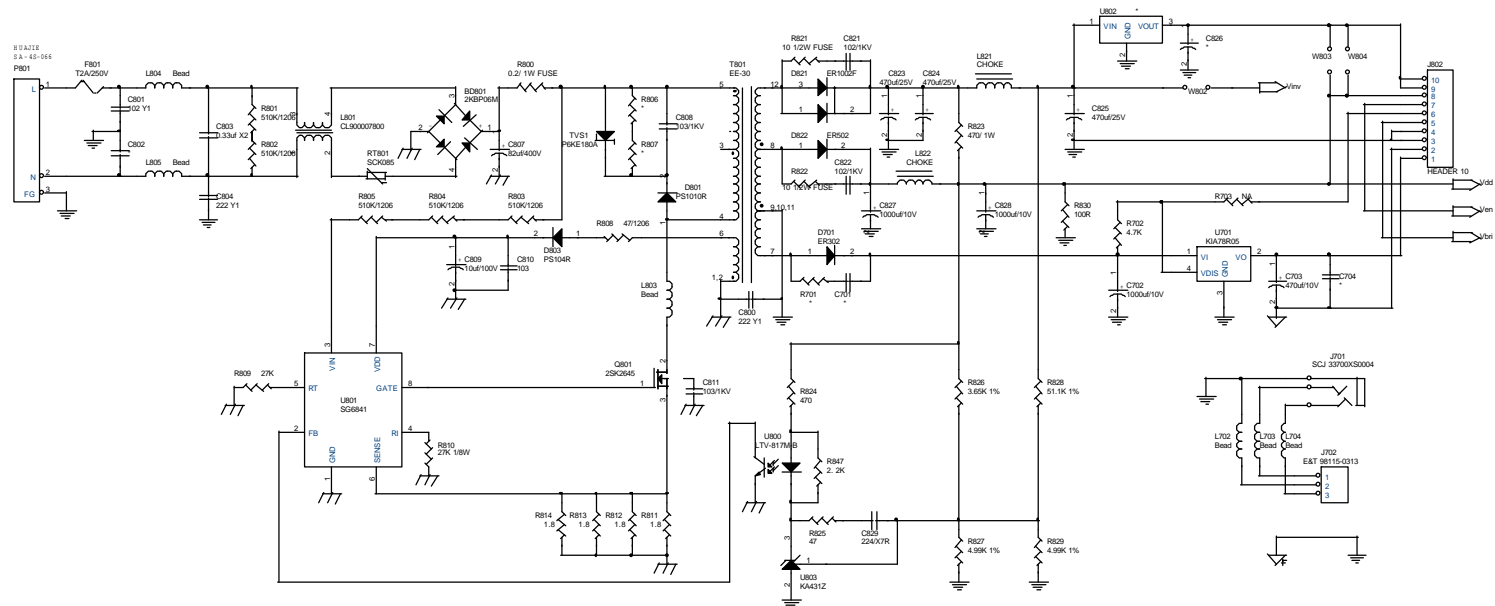


### 6.1.2 Performance Troubleshooting



### 6.1.3 Function Troubleshooting

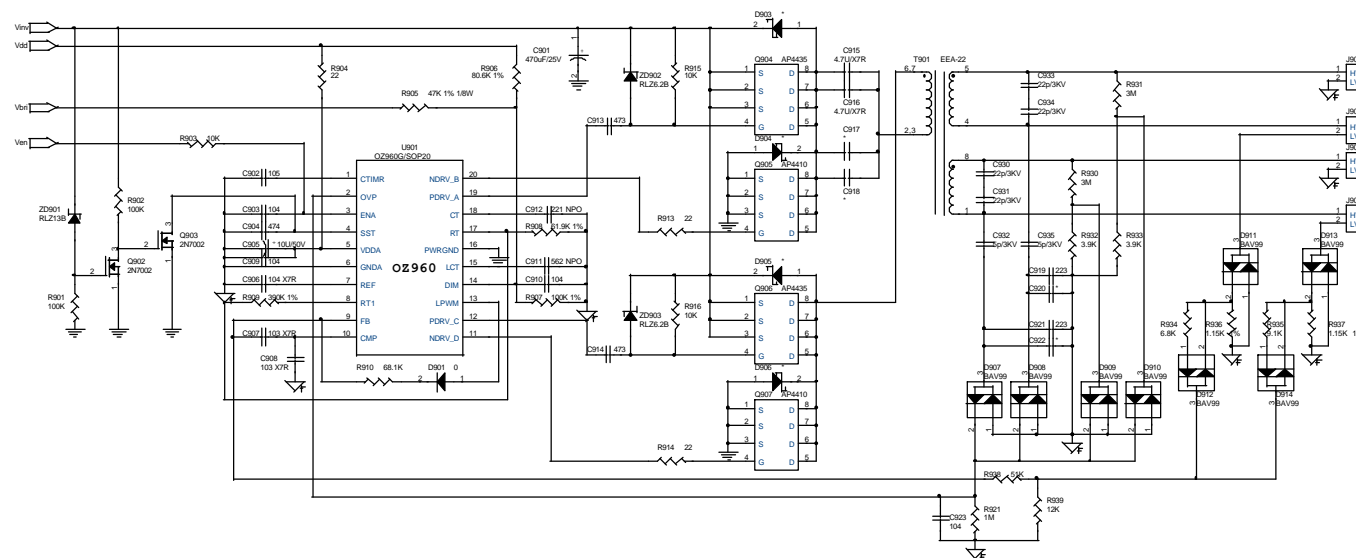
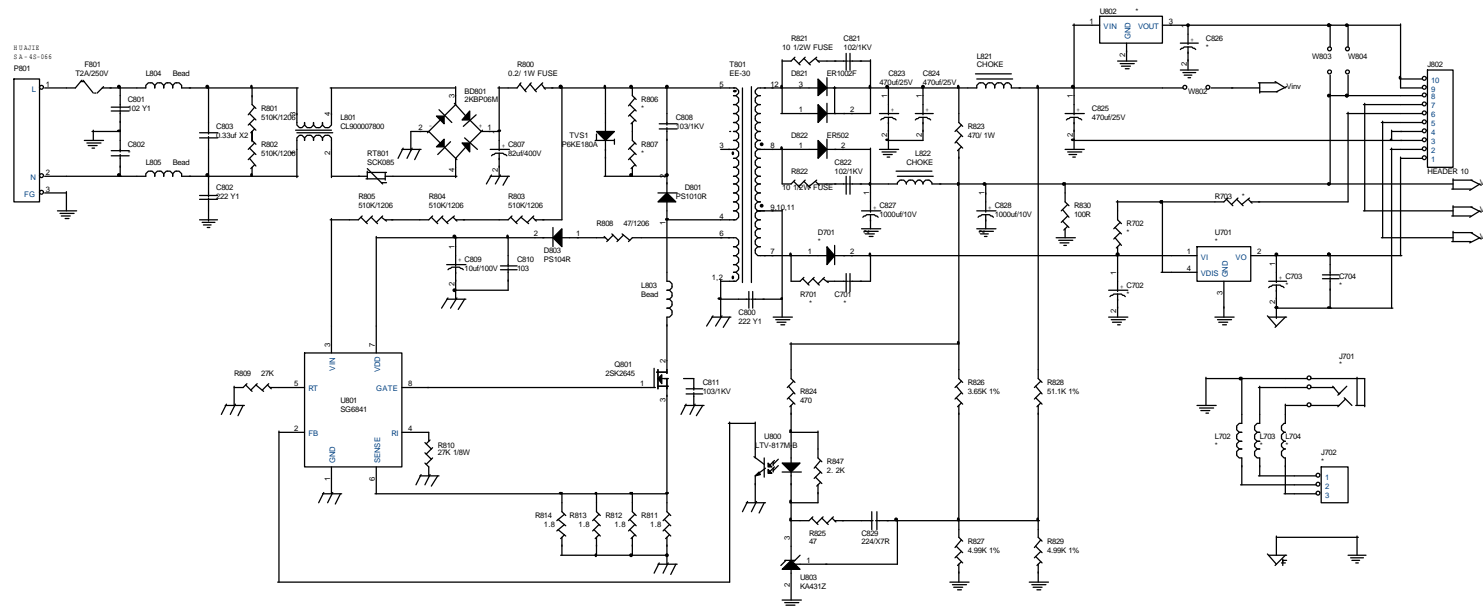




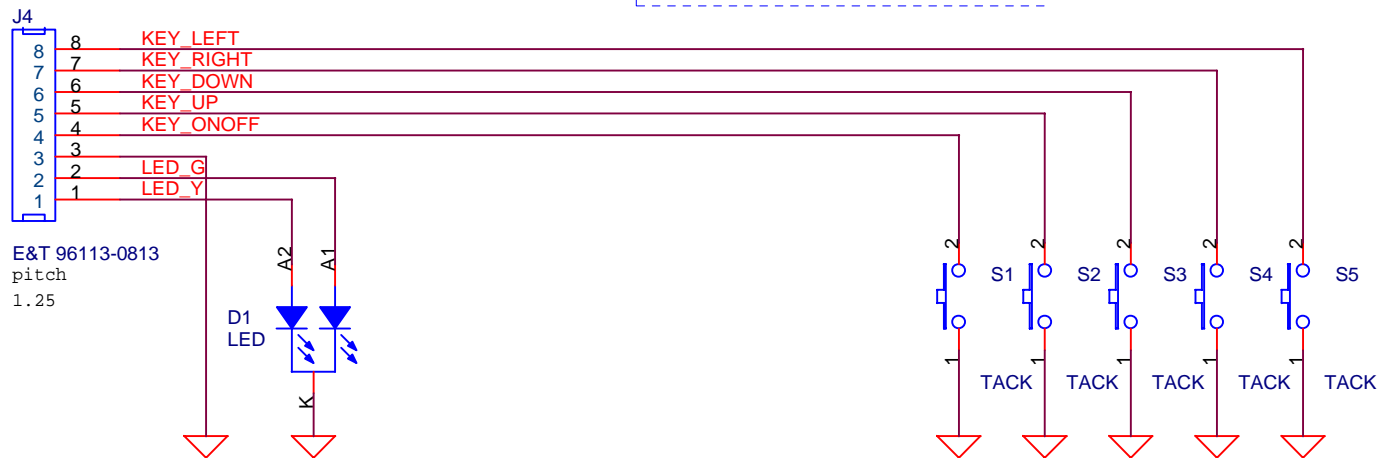
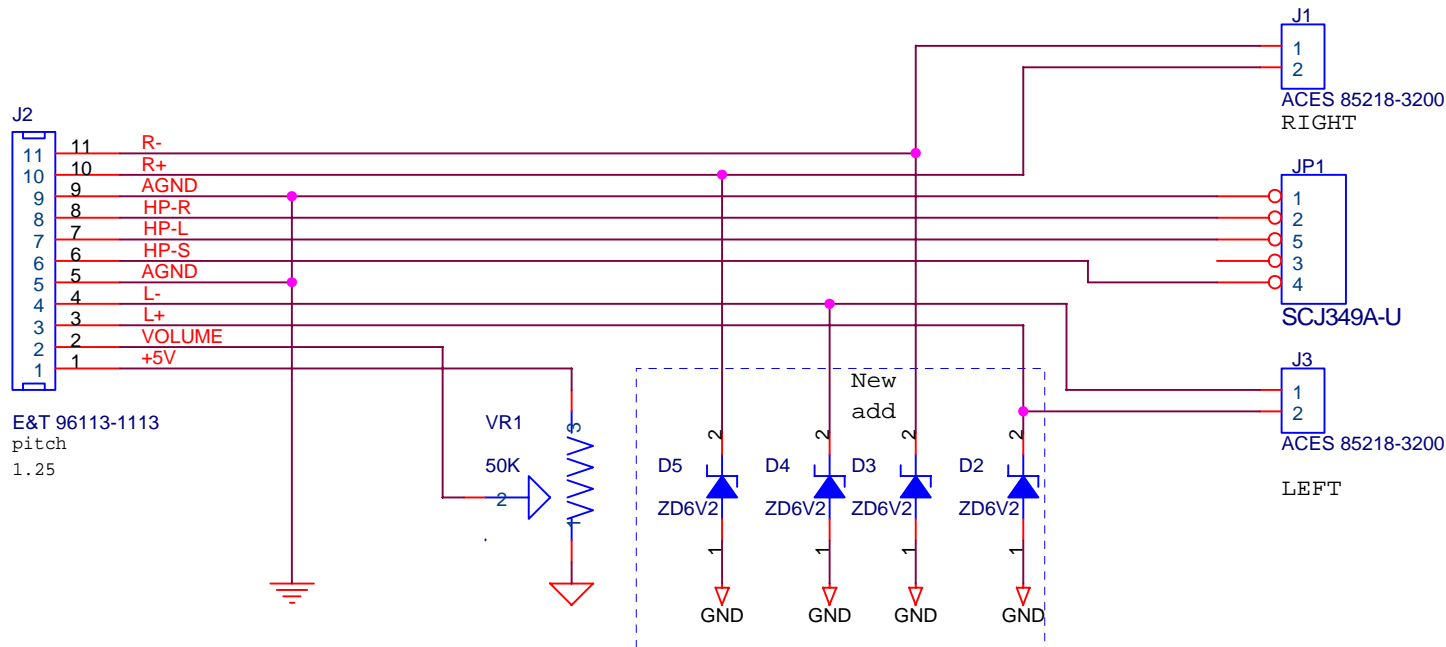
**PCB Name-Rev : VP747-0B**

\*The mark "#" to indicate that Part non-use

Schematic, POWER/B VP-747LP877		
Size A2	Document Number 403AAX	Rev 1B
<div style="display: flex; justify-content: space-between;"> <span>Wednesday, May 26, 2024</span> <span>Sheet 2 of 3</span> </div>		



*The mark "@" to indicate that Part non-use		
PCB Name-Rev : VP747-0B		
Diamond Digital DV171J(B)		
Doc	SCHEMATIC, POWER/B VP-58 3LP877	
Size	Document Number	Rev
A2	403AAX	1B
Date	Wednesday, May 26, 2004	Drawn 3 d 3



## Diamond Digital DV171J(JB)

Title

**SCHEMATIC, KEY/B VK-723, LES677/777**

Size  
A

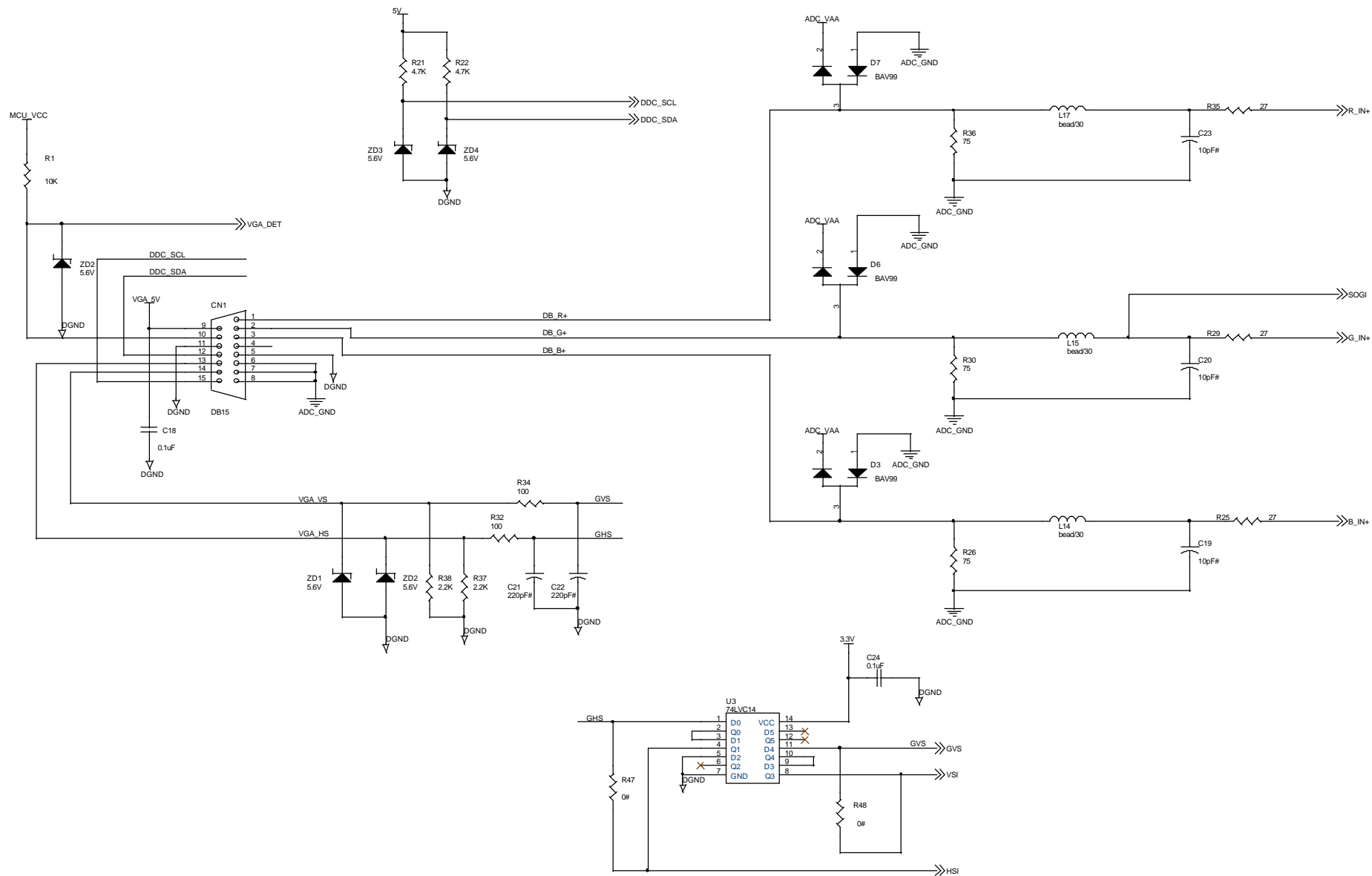
Document Number  
404AAD

Rev  
1A

Date: Friday, July 04, 2003

Sheet 2 of 2





Diamond Digital DV171J(JB)		
Title		
SCHEMATIC CTRLBLM-749		
Size	Document Number	Rev
	401AAW	1C
Date:	Wednesday, May 26, 2004	Sheet 2 of 7

